

MASTER OF SCIENCE IN METEOROLOGY

A CASE STUDY OF THE MONTEREY BAY SEA BREEZE ON 25 AUGUST 1997

Steven M. Taylor-Civilian

B.S., Pennsylvania State University, 1992

Master of Science in Meteorology-September 1998

Advisors: Wendell A. Nuss, Department of Meteorology

Douglas K. Miller, Department of Meteorology

On 25 August 1997 a controlled burn on the former Fort Ord property raged out of control. The sea breeze was responsible for transporting the acrid smoke into the Salinas Valley. The PSU/NCAR mesoscale model, MM5, was run at 4 km grid resolution twice using two different PBL schemes (MRF and Burk-Thompson) and then verified by observations from several local mesoscale networks, including wind profiler data. The MM5 simulation was able to depict the 3-D structure of the sea breeze and differentiate between the local mountain-valley forcing and the large-scale sea breeze forcing. These two individual forcing mechanisms were responsible for an observed double surge in the time series of winds at Fort Ord. Further investigation is needed into the surface parameterization/land use tables to improve the surface forcing.

DoD KEY TECHNOLOGY AREAS: Modeling and Simulation, Other (Meteorology)

KEYWORDS: Sea Breeze, Mesoscale Modeling, MM5 Simulations, Monterey Bay, Salinas Valley, Land Breeze

INTERACTIONS OF LARGE-SCALE TROPICAL MOTION SYSTEMS DURING THE 1996-1997 AUSTRALIAN MONSOON

Sylvia C. Taylor-Captain, United States Air Force

B.S., Pennsylvania State University, 1991

Master of Science in Meteorology-September 1998

Advisor: Chih-Pei Chang, Department of Meteorology

Second Reader: Patrick A. Harr, Department of Meteorology

During the northern winter monsoon, several large-scale tropical motion systems are active in the southern tropical region of the ITCZ and SPCZ, including the maritime continent, northern Australia and the West Pacific. Superimposed on the mean state are transient large-scale systems including the Madden-Julian Oscillation (MJO) propagating from the equatorial Indian Ocean, the northeasterly cold surges from the northern hemisphere, and the easterly waves from the central or western Pacific. This work studied the possible interactions among these large-scale systems and their roles in the development of tropical cyclones. GMS water vapor data and NCEP reanalysis data during December 1996 to March 1997 were used. Examination of daily maps revealed that most of the TC development requires the interaction of two or more large-scale transient systems. The most frequent occurrences involved the interaction of the MJO and cold surges, followed by the interaction of the MJO and easterly waves.

MASTER OF SCIENCE IN METEOROLOGY

DoD KEY TECHNOLOGY AREA: Other (Meteorology)

KEYWORDS: Australian Monsoon, Northern Winter Monsoon, Madden-Julian Oscillation, MJO, Tropical Cyclone, Cold Surge